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Advanced maternal age and outcomes of pregnancy: A retrospective study from South Africa

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Abstract

The changing patterns of becoming pregnant at an advanced age have a serious public health impact because of increased risks of adverse outcomes. Thus, the objective of this study was to find the adverse pregnancy outcome of advanced age women delivered at a tertiary hospital in South Africa. This was a retrospective comparative study was conducted targeting the records of pregnant patients who delivered at Dr. George Mukhari Hospital from 1st September to 30th November 2010 where the pregnancy outcomes of females who were more than 34 years old (advanced age women, n=341) were compared with adult women (age between 20 and 34 years, n=1604). Advanced maternal age women had significantly higher rate of preterm delivery (19.2% vs 14.7%), caesarean delivery (38.4% vs 35.3%), breech presentation (7.0% vs 3.9%), and low birth weight rate (27.9% vs 18.8%) compared to adult women (p<0.05). Fresh still birth (FSB) and macerated still birth (MSB) rate was higher (5.6%) among advanced age women compared to adult women (4.8%) but it was not significant (p=0.825). Advanced age women were 1.37 (OR=1.37, p=0.041) times more likely to have preterm delivery, and 1.67 (OR=1.67, p<0.001) times more likely to deliver low birth weight (LBW) babies compared to adult women. The study has shown that advanced age women have higher rates of preterm birth, caesarean delivery, and LBW. Knowledge about the risks associated with advancing age can be helpful for couples in their decisions regarding childbearing.

Keywords: Advanced maternal age, adult women, pregnancy outcome, tertiary hospital, South Africa

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Introduction

One of the aim of the UN-Millennium Development Goals is to reduce maternal mortality by 75% and the mortality of children below the age of 5 years by 67% until 2015 [1]. Studies have reported that half of the world's burden of maternal, newborn and child death with over 13000 mother, newborns and children dying everyday in sub-Saharan Africa [2, 3]. Thus, it is paramount importance to improve maternal, newborn and child health in Africa.

In the developed world, an increasing proportion of births are attributable to women of advanced maternal age (≥35 years) as couples in these industrialized nations have decided to delay marriage and childbearing [4, 5, 6]. These changing patterns of advanced age are having a significant public health impact because of increased risks of stillbirth, preterm birth and cesarean delivery [4, 7]. Reducing adverse perinatal outcomes requires comprehensive and systematic examination of the complex relations among factors that contribute to decisions about the timing of childbearing. In a systematic review study, researchers reported statistically significant association between advanced maternal age and stillbirth risk [8]. In another study from the USA concluded that advanced maternal age, prepregnancy obesity and socioeconomic factors were the most prevalent risk factors related to the stillbirths [9]. In another American population-based study, after adjusting for a large number of known predisposing conditions, had shown that maternal age as an independent risk factor for stillbirth at both extremes of reproductive age (≤19 and ≥35 years) [10]. Similarly, in an Italian population-based study found the risk of adverse pregnancy outcomes associated with advanced maternal age [5].

Studies have shown significant differences between the psychological experiences of younger and older women in labor. Older women typically believe that their age makes their infant vulnerable [11]. Very little information is available regarding pregnancy outcomes of the advanced age women in South Africa. Thus, the objective of this study is to find the adverse pregnancy outcome of advanced age women delivered at a tertiary hospital in South Africa.

Material and methods

Study design

This was a retrospective comparative study targeting the records of pregnant patients who delivered at Dr. George Mukhari Hospital (DGMH) from 1st September to 30th November 2010 where the pregnancy outcomes of females who were more than 34 years old (advanced age women) were compared with adult women (aged between 20 and 34 years).

Sample size

No sampling was required as all records of pregnant women who delivered between 1st September and 30th November 2010 were included in the study. During the study period, a total of 1604 women aged between 20 and 34 years and 341 women were 35 years or older.

Inclusion and exclusion criteria

All the pregnant women who delivered between 1st September and 30th November 2010 were included and excluded those mothers who were below the age of 20 years, diabetic, had cardiac problems and had multiple pregnancies.

Data collection

Data were collected from the labour ward delivery register and specific information's were transcribed onto the data collection form. The register is the only official record of deliveries and has recorded information on demographic data (name, age, address of mothers), the pregnancy (gestational age, antenatal care information and complications of pregnancy, obstetric, labour and perinatal information). The register was developed and distributed by the National Department of Health and is being used at DGMH.

The obstetric information on the register includes: presentation of foetus during labour, plurality, time of delivery (recorded in hours and minute), mode of delivery (normal vaginal, vaginal delivery using operative procedure such as vacuum or forceps and caesarean section), and complications of delivery (e.g., perineal and or cervical tear). Perinatal information includes: birth weight, birth outcome of babies (live birth, still birth, Apgar score in 1 and 5 minutes), post partum bleeding etc. All this data were recorded by the attending midwives.

Data analysis

Data were entered into a Microsoft Excel 2003 spread sheet and imported to SPSS 17.0 for window version for analysis. The demographics variables were summarized using descriptive summary measures: expressed as mean (standard deviation) for continuous variables, and percent for categorical variables. The chi-square test was used to find any association between categorical variables. To compare means between two groups, students' t-test was used. Binary logistic regression method was carried out to find if advanced maternal age was a significant predictor for the negative pregnancy outcome. All statistical tests were performed using two-sided tests at the 0.05 level of significance. For all regression models, the results were expressed as effect (or odds ratios for binary outcomes), corresponding two-sided 95% confidence intervals and associated *p*-values. *P*-values reported to three decimal places with values less than 0.001 being reported as <0.001. *P* values less than 0.05 considered significant.

Ethical consideration

Institutional approval was obtained from the Medunsa Research Ethics Committee of the University of Limpopo, South Africa before conducting this study. The researcher also concurrently obtained permission to carry out the study from the hospital management team.

Results

A total of 2445 deliveries occurred during the study period (1st September – 30th November' 2010). Of those, 141 deliveries had multiple pregnancies, and 359 women were below the age of 20 years and were excluded from the study. Table 1 summarizes maternal information of the study samples. Among the study sample, the prevalence of adult pregnancy, and advanced age pregnancy were 82.5%, and 17.5% respectively. The mean ages were significantly different between the two age groups as 26.16yrs and 38.09yrs ($p<0.001$). Parity was significantly associated with maternal age as 33.4% in adult women were nulliparous (had not previously being pregnant) compared to only 5% among advanced age women ($p<0.001$). Prevalence of HIV positive was significantly more among advanced age women (36.5%) compared to adult women (30.2%) ($p<0.001$) [Table 1].

Table 2 shows the association between maternal age and obstetrics and perinatal outcomes. Maternal age was significantly associated with preterm delivery as advanced age women (19.2%) had higher rate of preterm delivery compared to adult women (14.7%) [$p<0.026$]. Mode of delivery was also associated with maternal age as caesar-

ean delivery was more common among advanced age women (38.4%) compared with adult women (35.3%) [p<0.001]. Breech presentation was statistically more common among advanced age women (7.0%) compared to adult women (3.9%) [p=0.020]. Augmentation and induction rates were similar between adult and advanced age women (p=0.118 and p=0.169, respectively). Student t-test showed that mean birth weights of the new born babies were significantly different between the two groups (p<0.001). Similarly, LBW rate was significantly higher among advanced age women (27.9%) compared to adult women (18.8%) [p<0.001]. Perinatal outcomes such as FSB and MSB rate was higher among advanced age women (5.6%) but the rate was not significantly high as compared to adult women (4.8%) [p=0.825].

Table 1. *Mothers' baseline information*

Variables	Adult women (n=1604)	Advanced age women (n=341)	p-value
Mean age (SD)	26.16 (4.15)	38.09 (2.63)	p<0.001*
Parity			
Nulliparity	536 (33.4)	17 (5.0)	p<0.001
One or more	1068 (66.6)	324 (95.0)	
HIV status			
Positive	485 (30.2)	125 (36.7)	p<0.001
Negative	1039 (64.8)	197 (57.8)	
Unknown	80 (5.0)	19 (5.6)	

**Students' t-test*

Table 2. *Association between maternal age and obstetric outcomes*

Variable	Adult mother	Advanced age mother	p-value
Gestational age			
Preterm delivery	235 (14.7)	65 (19.1)	p=0.026
Term delivery	1369 (85.3)	276 (80.9)	
Mode of delivery			
Normal vaginal delivery	1038 (64.7)	210 (61.6)	p<0.001
Caesarean delivery	566 (35.3)	131 (38.4)	
Presentation at delivery			
Vertex	1542 (96.1)	317 (93.0)	p=0.020
Breech	62 (3.9)	24 (7.0)	
Augmentation	94 (5.9)	14 (4.1)	p=0.118
Induction	131 (8.2)	31 (9.1)	p=0.169
Birth weight			
Normal birth weight rate	1303 (81.2)	246 (72.1)	p<0.001
Low birth-weight rate	301 (18.8)	95 (27.9)	
Mean birth weight (SD)	2928.3g (781.82)	2772.6g (868.48)	p<0.001*
Perinatal outcomes			
Live birth	1527 (95.2)	322 (94.4)	p=0.825
FSB and MSB	77 (4.8)	19 (5.6)	

**Students' t-test*

Table 3. *Univariate binary logistic regression output.*

Dependant variables	Independent variable (Age group)*			
	Odds Ratio (OR)	p-value	95% CI for the OR	
			Lower	Upper
Preterm delivery	1.37	0.041	1.01	1.86
Caesarean delivery	1.14	0.274	0.90	1.46
Low Birth Weight	1.67	<0.001	1.28	2.19

**Adult mother as reference group*

Table 3 shows the results of the univariate binary logistic regression analysis where maternal age group as the independent variable and the variables that were significantly associated with it were considered dependent variables. The results show that advanced age women were 1.37 times more likely to have preterm delivery compared to adult women. Also advanced aged women were 1.67 times more likely to deliver LBW babies compared to adult women.

Discussion

This study investigates if advanced maternal age is a risk factor for negative pregnancy outcomes. The results of the study prove the hypothesis as advanced maternal age is a significant risk factor for preterm birth and delivery of low birth weight babies.

Preterm delivery rate in this study was significantly higher among advanced age women compared to adult women. The finding is supported by other earlier studies conducted elsewhere [7, 12, 13]. In another study it was concluded that there is a meaningful relation between the increasing mother's age and preterm labor [14].

Caesarean delivery rate was significantly more common among advanced age women compared with adult women. In a study conducted in the USA reported that the odds of caesarean delivery among 35-39 years and ≥ 40 years were 1.6 and 2.0, respectively [15]. Another study also found a statistically significant relation between the increasing rate of caesarean and the age of over 35 [16]. Researchers have reported the increasing rate of caesarean in aged women and claimed that there would be many reasons for this, including basic diseases, obstetric troubles, neonatal problems and decrease of the function with the increasing age of women [17].

In this study, breech presentation was significantly higher among advanced age women compared to adult women. This is in line with the study conducted in elsewhere. The study reported the measure of breech presentation with an increase in the age of women [18].

Regarding LBW, advanced age women had significantly higher rate of LBW compared to adult women. Many studies have reported the same. Hoffman and his colleagues have shown significant relationship between the increasing rate of LBW and very LBW in aged women. They considered the mother`s high age as an indirect factor for low birth weight [19]. In a study it was concluded that there was a statistically significant relation between the increased mother's age and low birth weight which justified that they can be secondary, as a result of the increase in diabetes, preeclampsia and placenta previa [7]. In another study concluded no significant difference in birth weight of babies comparing between aged and young women [20].

Study limitations

This was a retrospective study so it was prone to missing data. We had a large sample size which minimized this bias. The results of this study only focus on women delivering live infants in health facilities and does not account for early abortions or home deliveries and this constitutes an important bias. The study did not have enough information regarding number of antenatal care visits. Therefore, no conclusion could be drawn about the importance of antenatal care. Several other factors with known influence on pregnancy outcome including other infectious diseases such as HIV, and syphilis, socio-economic information of the mothers like educational level, employment status were not included as well as exposure to tobacco and alcohol were not evaluated in this study. So the importance of these factors on adverse outcomes therefore can not be answered conclusively in this study.

Conclusion

The study has shown that despite higher rates of obstetric intervention, advanced age women have higher rates of preterm birth, caesarean delivery, and LBW. The recent social trend toward delayed childbearing or having children at an advanced age will thus have an increasing impact on the demand for health care services and population health trends. Knowledge about the risks associated with advancing age can be helpful for couples in their decisions regarding childbearing.

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